

Housing, in particular a housing intended to contain a printed circuit board or the like, and process for obtaining it

The present invention relates to a housing, in particular a housing intended to contain a printed circuit board (PCB) or the like, and to a process for obtaining it.

It is known practice, particularly in the field of electronics, to use a housing within which electronic components are placed on a printed circuit board. This housing comprises a lid which may, if appropriate, be formed by the printed circuit board. The lid is screwed onto the housing so as to close the latter in a reversible manner. It is common for the screws used to be screws which themselves generate their tapped hole when being screwed in, such as self-tapping or thread-forming screws. As the screws are being screwed in, flakes are produced and they drop inside the housing, the screws being introduced from the outside of said housing. The flakes thus produced often drop onto the printed circuit board. They may then create a short circuit between the leads of the electronic components situated on the printed circuit board or between two tracks of this circuit board. A flake may thus render an electronic device unusable.

Since the components are nowadays installed ever closer to one another on the printed circuit boards, the problems of short circuits created by flakes are increasingly frequent and are therefore becoming increasingly inadmissible. It is thus an object of the present invention to provide a housing which, by virtue of its design, prevents a flake from reaching the printed circuit board intended to be accommodated within said housing. Preferably, the proposed housing does not entail any significant extra cost over a housing of the prior art.

To this end, the invention proposes a housing, in particular a housing intended to contain electronic components or the like, comprising a support having a bore for receiving a fixing screw.

According to the invention, this housing additionally comprises, facing the bore for receiving the screw, a receptacle extending inside the housing.

In this way, the flakes formed when the screw is first screwed into its bore are collected in the receptacle and are not able to contaminate the electronic components inside the housing.

Preferably, the receptacle extends from the support having the bore and, with the exception of the region in which the bore is situated, forms a closed space with this support. Once the screw is in place, the flakes are thus perfectly contained and are therefore unable to create any short circuits in the components.

The receptacle is, for example, obtained by stamping. In a preferred embodiment, it has a generally tubular shape of circular cross section which is closed at its end opposed to the bore.

The support originating from the housing and having the bore may take the form of a lug folded over with respect to a wall of the housing. The receptacle is then, advantageously, borne by a tab folded onto the lug.

The present invention also relates to a cut and stamped sheet-metal blank, characterized in that it has:

- a substantially rectangular lug attached by a first side, substantially over its entire length, to the remainder of the sheet-metal blank,
- a bore made in the lug,
- a tab connected to the lug by a side in the vicinity of the first side, and
- a receptacle obtained by a stamping operation performed on the tab.

Such a sheet-metal blank makes it possible for a housing according to the invention to be produced from a single piece

of metal. To facilitate production of the housing, and particularly folding of the tab, a substantially rectangular cutout is advantageously provided between the tab and the lug so as to form a hinge.

The present invention also proposes a process for producing a housing, in which a sheet-metal blank is cut and then folded, characterized in that it comprises the steps which follow:

- production of a sheet-metal blank as described above,
- folding the tab flat onto the lug, and
- folding the lug at a right angle with respect to the sheet-metal blank,

it being possible for the last two steps to be carried out in whatever order.

Details and advantages of the present invention will become more clearly apparent from the description which follows, given with reference to the appended schematic drawing, in which:

figure 1 is a partial view of a housing according to the invention in the region of a fixing screw,

figure 2 is a view in section taken along the section line II-II of figure 4,

figure 3 is a front view of the elements represented in figure 1,

figure 4 is a view taken along the section line IV-IV of figure 3,

figure 5 is a top view of the cut-out section of a sheet-metal blank for obtaining the portion represented in figure 1, and

figure 6 is a view in section taken along a section line VI-VI of figure 5.

Figure 1 shows, viewed from below, the mounting of a lid 2 on a housing 4. The lid 2 may be a sheet-metal lid or one made of any other material, or else it may also be a printed circuit board. The components fixed to this printed circuit board are then oriented toward the inside of the housing when this printed circuit board is fixed to the housing 4. A screw 6 can be seen in figures 2 to 4 for keeping the lid 2 on the housing 4. This screw is preferably a thread-forming screw which provides excellent fastening without the use of a nut.

Figures 1 to 4 of the drawing show a portion of a side wall 8 of the housing 4. The lid 2 is positioned perpendicularly to this side wall 8. To make it possible for the lid 2 to be mounted, the side wall 8 comprises a lug 10 made in one piece with the side wall 8 and folded over at a right angle to this wall toward the inside of the housing. A bore 12 for receiving the thread-forming screw 6 is made in this lug 10. Provision is made, in a known manner, for this bore to be of a smaller diameter than the shank diameter of the screw 6. Thus, in a known manner, when the screw 6 is screwed into the bore 12 it deforms the lug 10 around the bore 12 so as to form a tapped hole in the lug 10.

The lug 10 bears a receptacle 14. The latter is substantially circular cylindrical in shape and is tubular. It extends perpendicularly to the plane of the lug 10 (itself parallel to the lid 2). The receptacle 14 rests on the lug 10. It is open toward this lug 10 and is closed at its opposed end. The end wall 16, that is to say the wall situated away from the lug 10, is for example of hemispherical shape. The edge of the receptacle on the side facing the lug 10 surrounds the bore 12 made in this lug 10. The receptacle 14 thus creates a closed space whose only opening is the bore 12 and which is completely closed when a screw 6 is situated in this bore.

The receptacle 14 is formed on a tab 18 forming only a single piece with the lug 10. This tab 18 is folded over at 180° with respect to the lug 10. The tab 18 is joined to the lug 10 by

two fine strips of metal forming a hinge 20. The receptacle 14 and its end wall 16 are obtained for example by stamping the tab 18.

The lug 10 and the receptacle 14 may advantageously form only a single piece with the wall 8 of the housing 4. It is possible by cutting, stamping and folding to obtain the lug 10 for mounting the screw 6 and the receptacle 14 which acts as a flake trap for the flakes produced when the thread-forming screw 6 is screwed into its bore 12 for the first time. Figure 5 shows, following cutting and prior to folding, the detail of a metal sheet used for producing the housing 4 represented in figures 1 to 4. This figure 5 depicts the wall 8, the lug 10 in which the bore 12 is made, and the tab 18 bearing the receptacle 14 and joined to the lug 10 by the hinge 20. The lug 10 is attached to the wall 8. The tab 18, for its part, is attached to the wall 8 only by way of the lug 10 and the hinge 20. To produce said hinge, the sheet-metal blank used for producing the housing 4 has a rectangular cutout 22 separating the lug 10 from the tab 18. The stamping procedure forming the receptacle 14 may be carried out immediately before cutting the metal sheet. This operation is performed on the same press using an appropriate tool. Once the cutting operation has been carried out, two folding operations are carried out successively. The tab 18 is folded through 180° about a first folding axis 24 and then the assembly formed by the tab 18 and the lug 10 is folded through 90° about a second folding axis 26 so as to be turned toward the inside of the housing 4. It is thus possible, virtually without extra cost with respect to a conventional housing comprising a lug but not a tab provided with a receptacle, to produce a flake trap which ensures that not a single flake resulting from the screw 6 being screwed into the bore 12 will contaminate the electronic components situated inside the housing 4. Any short circuit problems between the leads of the components or the tracks of the printed circuit board can thus be avoided. This is achieved without attaching any additional parts and virtually without extra cost with respect to the housings of the prior art.

The present invention is not restricted to the preferred embodiment described above by way of non-limiting example. It also relates to all variant embodiments within the scope of a person skilled in the art within the framework of the claims hereinbelow.

Thus, for example, the lug 10 and the tab 18 are not necessarily placed on an edge of the side wall 8, but may be obtained at any point on said side wall by forming a cut in said wall 8 over the periphery of the assembly formed by the lug 10 and tab 18, with the exception of the side of the lug 10 corresponding to the second folding axis 26.

Furthermore, the shape of the receptacle may differ from that described. The process used to obtain it, for its part, may also be different. In this respect, a receptacle consisting of a part which is separate from the housing may be envisaged. For example, in the case of a housing whose production requires welding operations, it may be envisaged to weld a part in the region of a bore intended to receive a thread-forming screw so as to form the flake trap.